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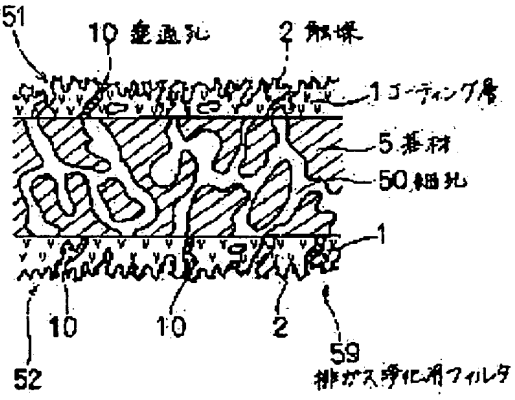
(54) FILTER FOR PURIFYING EXHAUST GAS AND ITS MANUFACTURE

(57)Abstract:
PURPOSE: To provide a filter for purifying exhaust gas in which the purification capacity can be improved, and the pressure loss can be reduced, and further provide its manufacturing method.
CONSTITUTION: In manufacturing a filter 59 for purifying exhaust gas, the surface of a porous base material 5 is coated with a mixture of ceramic powder and a through hole forming material, the product is burned to sinter the ceramic powder to form a coating layer 1, and the hole forming material is eliminated by burning to form through holes 10 in the coating layer 1. The filter has a coating layer I which is formed on the surface of the porous base material 5 and carries a catalyst 2 for purifying exhaust gas. The coating layer 1 has through holes penetrating from the surface of the layer 1 to the base material 5. It is preferable that the coating layer 1 is formed not only on the surface of the base material 5 but also on the surface of a pore 50 inside the base material 5.



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CLAIMS

[Claim(s)]
[Claim 1] On the front face of the base material which has much pores, the mixture of ceramic powder and free passage hole formation material is covered. Subsequently While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material by heating this mixture The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned free passage hole formation material is made burned down, and is open for free passage from the front face to the front face of a base material in the above-mentioned coating layer.
[Claim 2] While covering the mixture of ceramic powder and free passage hole formation material on the front face of the base material which has much pores While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material by making the above-mentioned mixture introduce into the pore internal surface inside the above-mentioned base material, and subsequently heating this mixture The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned free passage hole formation material is made burned down, and is open for free passage in the above-mentioned coating layer from the front face to the front face of a base material, or the pore internal surface inside a base material.
[Claim 3] It is the manufacture approach of the exhaust gas clarifying filter characterized by the above-mentioned free passage hole formation material being the generation-of-gas matter in claim 1 or 2.
[Claim 4] It is the manufacture approach of the exhaust gas clarifying filter characterized by the magnitude of the above-mentioned free passage hole formation material being the same as the thickness of a coating layer in claim 1 or 2, or being larger combustible material than the thickness of a coating layer.
[Claim 5] It is the manufacture approach of the exhaust gas clarifying filter characterized by the magnitude of the above-mentioned free passage hole formation material being the same as that of the pore of a base material in any 1 term of claims 1-4, or being smaller than pore.
[Claim 6] The manufacture approach of the exhaust gas clarifying filter characterized by to form the free passage hole which this coating layer is made to generate many micro cracks, and is open for free passage from the front face to the front face of a base material in a coating layer in the front face of the base material which has much pores while sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material by covering and heating two or more sorts of ceramic powder with which contraction differs.
[Claim 7] While covering two or more sorts of ceramic powder with which contraction differs on the front face of the base material which has much pores The above-mentioned ceramic powder is made to introduce into the pore internal surface inside the above-mentioned base material. Subsequently While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material by heating the above-mentioned ceramic powder The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which this coating layer is made to generate many micro cracks, and is open for free passage in a coating layer from the front face to the front face of a base material, or the pore internal surface inside a base material.
[Claim 8] Into the slurry containing ceramic powder, hyperviscous oily matter is added, the above-mentioned slurry is agitated strongly, and the oil particle which consists of hyperviscous oily matter is formed. Subsequently While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material by covering and heating the above-mentioned

slurry on the front face of the base material which has much pores The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which is open for free passage from the front face of a coating layer to the front face of a base material by generating gas, vanishing the above-mentioned oil particle, and missing the above-mentioned gas from the oil particle in this coating layer to a way outside a coating layer.

[Claim 9] Into the slurry containing ceramic powder, hyperviscous oily matter is added, the above-mentioned slurry is agitated strongly, and the oil particle which consists of hyperviscous oily matter is formed. Subsequently While covering the above-mentioned slurry on the front face of the base material which has much pores, a slurry is made to introduce into the pore internal surface inside the above-mentioned base material. Subsequently While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face and the above-mentioned base material internal surface of the above-mentioned base material by heating the above-mentioned slurry By generating gas, vanishing the above-mentioned oil particle, and missing the above-mentioned gas from the oil particle in this coating layer, to a way outside a coating layer The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which is open for free passage from the front face of a coating layer to the front face of a base material, or the pore internal surface inside a base material.

[Claim 10] The charge of foam which foams on the front face of the base material which has much pores in the shape of a mesh is applied. Subsequently By making this charge of foam foam, being the same as the magnitude of the charge of foam which carried out [above-mentioned] foaming on the front face of the charge of foam on which it subsequently foamed, or covering and heating the slurry containing ceramic powder in larger thickness than it to it The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned charge of foam is made burned down, and is open for free passage in the shape of a mesh from the front face of a coating layer to the front face of a base material while making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material.

[Claim 11] While covering the charge of foam which foams on the front face of the base material which has much pores in the shape of a mesh Make the above-mentioned charge of foam introduce into the pore internal surface inside the above-mentioned base material, and, subsequently the above-mentioned charge of foam is made to foam. Subsequently By it being the same as the magnitude of the charge of foam which carried out [above-mentioned] foaming, or applying to larger thickness than it and heating the slurry containing ceramic powder on the foaming front face of the charge of foam While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material The manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned charge of foam is made burned down, and is open for free passage in the shape of a mesh from the front face of a coating layer to the front face of a base material, or the pore internal surface inside a base material.

[Claim 12] It is the manufacture approach of the exhaust gas clarifying filter characterized by the average pole diameter of the above-mentioned free passage hole being 10-60 micrometers in any 1 term of claims 1-11.

[Claim 13] It is the manufacture approach of the exhaust gas clarifying filter characterized by the porosity of the above-mentioned coating layer being 30 - 80% in any 1 term of claims 1-12.

[Claim 14] It is the exhaust gas clarifying filter characterized by the porosity of the above-mentioned coating layer being 30 - 80% while the above-mentioned coating layer has the free passage hole which is open for free passage from the front face to the front face of the above-mentioned base material in the exhaust gas clarifying filter which comes to have the coating layer which makes the catalyst which purifies the base material which has much pores, and the exhaust gas which is formed in the front face of this base material, and is discharged by the internal combustion engine support.

[Claim 15] In the exhaust gas clarifying filter which comes to have the coating layer which makes the catalyst which purifies the base material which has much pores, and the exhaust gas which is formed in this base material front face and the pore internal surface inside this base material, and is discharged by the internal combustion engine support It is the exhaust gas clarifying filter characterized by the porosity of the above-mentioned coating layer being 30 - 80% while the above-mentioned coating layer has the free passage hole which is open for free passage from the front face to the front face of a base material, or the pore internal surface inside a base material.

[Claim 16] It is the exhaust gas clarifying filter characterized by the average pole diameter of the above-

mentioned free passage hole being 10-60 micrometers in claim 14 or 15.
[Claim 17] It is the exhaust gas clarifying filter characterized by the above-mentioned coating layer having covered the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material in any 1 term of claims 14-16.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the exhaust gas clarifying filter used in order to carry out uptake for example, of the diesel particulate, and its manufacture approach.
[0002]
[Description of the Prior Art] As shown in drawing 23 , uptake of the particulate discharged by the Diesel engine is carried out with the filter 9 of honeycomb structure. This filter 9 consists of many fluid ways 92 prepared between the porous base material 91 and the base material 91. And it considered conventionally preparing the coating layer which consists of an activated alumina which supported the catalyst on the interior or the front face of a base material by the following approaches for the particulate improvement in collection efficiency, the improvement in a regeneration rate, and exhaust-gas purification.
[0003] The 1st approach is the approach of controlling distribution of the amount of support of the catalyst over the depth direction of a coating layer (publication-number 1-No. 107847 official report). By this approach, the activated alumina with a as large specific surface area as a coating layer which makes a catalyst support as 150m2 / g is used.
[0004] The 2nd approach is the approach of forming a coating layer by making the pore front face inside the base material of a filter cover an alumina, carrying out suction removal of the excessive alumina under reduced pressure (publication-number 2-No. 102707 official report).
[0005] The 3rd approach is the approach of making the amount of coats fixed within the limits, and carrying out the path and volume of pore which are formed between alumina powder to more than constant value about the alumina which is the component of a coating layer, (publication-number 2-No. 107340 official report).
[0006]
[Problem(s) to be Solved] However, there are the following problems in the above-mentioned conventional exhaust gas clarifying filter. That is, in the 1st approach, particle size is as fine as 5-10 micrometers, and the above-mentioned activated alumina has a high consistency, while specific surface area is large. Therefore, the resistance at the time of gas passing a coating layer becomes high, raises the pressure loss of gas flow, and causes the problem of engine loss of power.
[0007] In the 2nd approach, although the alumina of the low part of the resistance in a coating layer can be attracted when it draws in with a reduced pressure pump, resistance becomes low further and air concentrates the part which carried out opening by suction on the part. Therefore, the alumina of other parts cannot fully be attracted. Moreover, an alumina solidifies in the part where a pole diameter is small, and the pore of a coating layer does not carry out opening completely depending on the suction force of a suction pump. Therefore, opening of the pore cannot be carried out over the whole region of a filter.
[0008] In the 3rd approach, although a pole diameter and the volume are limited, the technique of making pore is unknown, and resistance becomes high and what is not open for free passage even if there is pore has the small effectiveness of the formation of low voltage disadvantage.
[0009] This invention tends to offer the exhaust gas clarifying filter which can attain reduction-ization of pressure loss with improvement in the purification engine performance, and its manufacture approach in view of this conventional trouble.
[0010]
[Means for Solving the Problem] There are the following eight manufacture approaches as the manufacture approach of the exhaust gas clarifying filter concerning this invention. The 1st manufacture approach covers the mixture of ceramic powder and free passage hole formation material on the front face of the base

material which has much pores like according to claim 1. Subsequently While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material by heating this mixture It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned free passage hole formation material is made burned down, and is open for free passage from the front face to the front face of a base material in the above-mentioned coating layer.

[0011] According to this manufacture approach, the coating layer of a high specific surface area can be formed on the surface of a base material. Therefore, if the above-mentioned coating layer is made to support the catalyst for emission gas purification, the touch area of a catalyst and exhaust gas can increase and the maximum exertion of the catalyst engine performance of a catalyst can be carried out. Moreover, since the free passage hole which the front face to a base material opens for free passage can be formed in a coating layer, it can pass from the front face of a coating layer smoothly to a base material through the above-mentioned free passage hole, and pressure loss of exhaust gas is low.

[0012] Moreover, exhaust gas enters not only the front face of a coating layer but its interior. Therefore, a coating layer can demonstrate a cleaning effect in three dimensions in the whole coating layer by making the catalyst for emission gas purification support. Therefore, improvement in the purification engine performance of a filter can be aimed at. Moreover, as mentioned above, the purification engine performance of a filter is high, and since pressure loss is low, it can also attain a miniaturization. Therefore, according to the manufacture approach of the above 1st, the exhaust gas clarifying filter of the outstanding purification engine performance and low pressure loss can be obtained.

[0013] As the above-mentioned free passage hole formation material, a thing [using the generation-of-gas matter] according to claim 3 is [like] desirable, for example. The reason is that the free passage hole which the front face to a base material opens for free passage in a coating layer is formed by generating gas from the generation-of-gas matter with heating, and missing the gas to a way outside a coating layer. As the above-mentioned generation-of-gas matter, the Matsumoto Yushi-Seiyaku micro staple fiber wear which enclosed the commercial butane with thermoplastics is used, for example.

[0014] Moreover, as the above-mentioned free passage hole formation material, the magnitude is the same as the thickness of a coating layer, or a thing [that it is larger combustible material than the thickness of a coating layer] according to claim 4 is [like] desirable, for example. The reason is that the free passage hole which the front face of a coating layer to a base material opens for free passage forms, when the above-mentioned combustible material is burned down with heating.

[0015] As the above-mentioned combustible material, the ingredient which consists of carbon, resin, a wax, etc. is used, for example. moreover, the configuration of the above-mentioned combustible material -- for example, a whisker -- or they are needlelike (the shape of a fiber), a globular shape, and pillar-shaped **.

[0016] Furthermore, the thing according to claim 5 with it of the above-mentioned free passage hole formation material is [like] desirable. [the magnitude the same as the pore of a base material or and] [smaller than pore] Thereby, free passage hole formation material can invade smoothly in pore, and can form the above-mentioned free passage hole in the coating layer which covers a pore internal surface. On the contrary, when the magnitude of free passage hole formation material is larger than the pore of a base material, it cannot enter in pore, but the inside of pore starts blinding with ceramic powder, and free passage hole formation material has a possibility that the pressure loss of a filter may become large.

[0017] Moreover, the free passage hole formation material from which magnitude differs can be added to ceramic powder. Thereby, the free passage hole with which magnitude differs can form the coating layer distributed to homogeneity over the whole coating layer. Moreover, the ceramic powder which added the free passage hole formation material of a certain magnitude, and the ceramic powder which added the free passage hole formation material of other magnitude can also be separately covered on the surface of a base material. Thereby, according to the thickness of a coating layer, the magnitude of a free passage hole is changeable.

[0018] And the thing [that it is 10-60 micrometers] according to claim 12 of the average pole diameter of the above-mentioned free passage hole is [like] desirable. In the case of less than 10 micrometers, while the purification engine performance of a filter improves, the pressure loss of a filter is high and, in addition, there is it. On the other hand, in exceeding 60 micrometers, while the pressure loss of a filter becomes low, while exhaust gas has not been purified, a filter is passed and there is a possibility that the purification engine performance of a filter may fall (refer to drawing 10 and drawing 11).

[0019] The thing [that it is 30 - 80%] according to claim 13 of the porosity of the above-mentioned coating layer is [like] desirable. There is a possibility that the pressure loss of a filter may become high in less than

30% of case. On the other hand, in exceeding 80%, there is a possibility that the purification engine performance of a filter may fall (refer to drawing 10 and drawing 11). Porosity means the percentage of the pore containing a free passage hole and a little fine hole, and the apparent volume of a coating layer here.
[0020] Next, the above-mentioned coating layer achieves the duty which the touch area of a catalyst and exhaust gas is expanded [duty] and demonstrates the catalyst engine performance of a catalyst to the maximum extent by being prepared on the surface of a base material. In this invention, the front face of a base material means either [at least] the top face of a base material, or an inferior surface of tongue. In forming the above-mentioned coating layer in the front face of the above-mentioned base material, there is the approach (the sinking-in method) of infiltrating into the solution which contains the mixture of the ceramic powder which consists the above-mentioned base material of a pole diameter of a base material size, and free passage hole formation material, for example.
[0021] As the above-mentioned coating layer, ceramic powder, such as an activated alumina and a zeolite, is used, for example. In this, it is desirable to use an activated alumina. This has the high thermal resistance of an activated alumina, and is because an operating environment serves as an elevated temperature. Much pores are formed in the interior of the above-mentioned base material in the shape of a three-dimensions mesh. As the above-mentioned base material, cordierite or SiC (silicon carbide) is used, for example.
[0022] Next, while the 2nd manufacture approach covers the mixture of ceramic powder and free passage hole formation material on the front face of the base material which has much pores like according to claim 2 While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material by making the above-mentioned mixture introduce into the pore internal surface inside the above-mentioned base material, and subsequently heating this mixture It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned free passage hole formation material is made burned down, and is open for free passage in the above-mentioned coating layer from the front face to the front face of a base material, or the pore internal surface inside a base material.
[0023] According to this manufacture approach, a coating layer can be formed in homogeneity not only at the front face of a base material but at the pore internal surface inside a base material. Therefore, when a coating layer is made to support the catalyst for emission gas purification, a catalyst will adhere not only to the front face of a base material but to the pore internal surface inside a base material. Therefore, exhaust gas is purified by the above-mentioned catalyst also not only in the front face of a base material but in the interior of a base material. So, the purification engine performance of exhaust gas becomes remarkably high. In addition, also in the 2nd manufacture approach, the same effectiveness as the manufacture approach of the above 1st can be acquired.
[0024] In introducing the above-mentioned mixture in the pore inside a base material, while covering the above-mentioned mixture on the surface of a base material, there is a method (the sinking-in method) of, for example, infiltrating a base material into the solution containing the above-mentioned mixture. Moreover, when a base material is a honeycomb filter, the above-mentioned solution is slushed from the single-sided opening end face of a honeycomb filter, and there is an approach (suction method) of drawing in to the opening end face of the opposite side or the approach (the air pushing-in method) of pushing in the above-mentioned solution by air from the single-sided opening end face of a honeycomb filter. In the 2nd manufacture approach, it is desirable to use the free passage hole formation material used in the 1st approach of the above. The point of others in the 2nd manufacture approach is the same as that of the manufacture approach of the above 1st.
[0025] The 3rd manufacture approach next, by covering and heating two or more sorts of ceramic powder with which contraction differs on the front face of the base material which has much pores like according to claim 6 While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which this coating layer is made to generate many micro cracks, and is open for free passage from the front face to the front face of a base material in a coating layer.

[0026] According to this manufacture approach, it is not necessary to use the free passage hole formation material used by the above 1st and the 2nd manufacture approach. Therefore, a filter can be manufactured more simply than the 1st and 2nd approach. In addition, also in the 3rd manufacture approach, the same effectiveness as the manufacture approach of the above 1st can be acquired. As two or more sorts of ceramic powder with which the above-mentioned contraction differs, the ceramic powder which consists of combination of an alumina and cordierite is used, for example.

[0027] Next, while the 4th manufacture approach covers two or more sorts of ceramic powder with which contraction differs on the front face of the base material which has much pores like according to claim 7 The above-mentioned ceramic powder is made to introduce into the pore internal surface inside the above-mentioned base material. Subsequently While sintering the above-mentioned ceramic powder and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material by heating the above-mentioned ceramic powder It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which this coating layer is made to generate many micro cracks, and is open for free passage in a coating layer from the front face to the front face of a base material, or the pore internal surface inside a base material.
[0028] According to this manufacture approach, a coating layer can be formed in homogeneity not only at the front face of a base material but at the pore internal surface inside a base material. In addition, also in the 4th manufacture approach, the same effectiveness as the above 1st and the 3rd manufacture approach can be acquired.
[0029] In making the above-mentioned ceramic powder introduce into the pore internal surface inside the above-mentioned base material, while covering the above-mentioned ceramic powder on the front face of the above-mentioned base material, it can carry out by the sinking-in method explained in the 2nd manufacture approach, the suction method, or the air pushing-in method, for example. As two or more sorts of ceramic powder with which the above-mentioned contraction differs, the ceramic powder which consists of combination of an alumina and cordierite is used, for example.
[0030] Like, into the slurry containing ceramic powder according to claim 8, the 5th manufacture approach adds hyperviscous oily matter, agitates the above-mentioned slurry strongly, and forms the oil particle which consists of hyperviscous oily matter. Next, subsequently While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material by covering and heating the above-mentioned slurry on the front face of the base material which has much pores It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which is open for free passage from the front face of a coating layer to the front face of a base material by generating gas, vanishing the above-mentioned oil particle, and missing the above-mentioned gas from the oil particle in this coating layer, to a way outside a coating layer.
[0031] The above-mentioned hyperviscous oily matter serves as a fine oil particle by mixing in a slurry. This oil particle generates gas with heating, and disappears. In case the gas which occurred escapes to a way outside a coating layer, it forms the free passage hole which was open for free passage to the front face of a coating layer. Therefore, the exhaust gas clarifying filter which prepared the coating layer which has a free passage hole can be manufactured. In addition, it can do [acquiring the same effectiveness as the manufacture approach of the above 1st, or] also in the 5th manufacture approach. As the above-mentioned hyperviscous oily matter, lubricating oils, such as a Nippon Oil uni-way (trade name), are used, for example.

[0032] Like, into the slurry containing ceramic powder according to claim 9, the 6th manufacture approach adds hyperviscous oily matter, agitates the above-mentioned slurry strongly, and forms the oil particle which consists of hyperviscous oily matter. Next, subsequently While covering the above-mentioned slurry on the front face of the base material which has much pores, a slurry is made to introduce into the pore internal surface inside the above-mentioned base material. Subsequently While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face and the above-mentioned base material internal surface of the above-mentioned base material by heating the above-mentioned slurry By generating gas, vanishing the above-mentioned oil particle, and missing the above-mentioned gas from the oil particle in this coating layer, to a way outside a coating layer It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which is open for free passage from the front face of a coating layer to the front face of a base material, or the pore internal surface inside a base material.
[0033] According to this manufacture approach, a coating layer can be formed in homogeneity not only at the front face of a base material but at the pore internal surface inside a base material. In addition, also in the 6th manufacture approach, the same effectiveness as the above 1st and the 5th manufacture approach can be acquired.
[0034] In making the above-mentioned slurry introduce into the pore internal surface inside the above-mentioned base material, while covering the above-mentioned slurry on the front face of the above-mentioned base material, it can carry out by the sinking-in method explained in the 2nd manufacture approach, the suction method, or the air pushing-in method, for example. As the above-mentioned hyperviscous oily matter, the above-mentioned lubricating oil is used, for example.

[0035] The 7th manufacture approach applies the charge of foam which foams on the front face of the base material which has much pores like according to claim 10 in the shape of a mesh. Next, subsequently By making this charge of foam foam, being the same as the magnitude of the charge of foam which carried out [above-mentioned] foaming on the front face of the charge of foam on which it subsequently foamed, or covering and heating the slurry containing ceramic powder in larger thickness than it to it While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material, it is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned charge of foam is made burned down, and is open for free passage in the shape of a mesh from the front face of a coating layer to the front face of a base material.

[0036] In this manufacture approach, since the charge of foam is made to foam beforehand, a sponge-like free passage hole can be formed. As the above-mentioned charge of foam, an urethane raw material is used, for example. According to the 7th manufacture approach, the same effectiveness as the 1st manufacture approach can be acquired.

[0037] Next, while the 8th manufacture approach covers the charge of foam which foams on the front face of the base material which has much pores like according to claim 11 in the shape of a mesh Make the above-mentioned charge of foam introduce into the pore internal surface inside the above-mentioned base material, and, subsequently the above-mentioned charge of foam is made to foam. Subsequently By it being the same as the magnitude of the charge of foam which carried out [above-mentioned] foaming, or applying to larger thickness than it and heating the slurry containing ceramic powder on the foaming front face of the charge of foam While making the above-mentioned ceramic powder sinter and forming a coating layer in the front face of the above-mentioned base material, and the pore internal surface inside the above-mentioned base material It is the manufacture approach of the exhaust gas clarifying filter characterized by forming the free passage hole which the above-mentioned charge of foam is made burned down, and is open for free passage in the shape of a mesh from the front face of a coating layer to the front face of a base material, or the pore internal surface inside a base material.

[0038] According to this manufacture approach, a coating layer can be formed in homogeneity not only at the front face of a base material but at the pore internal surface inside a base material. In addition, also in the 8th manufacture approach, the same effectiveness as the above 1st and the 7th manufacture approach can be acquired.

[0039] In making the above-mentioned charge of foam introduce into the pore internal surface inside the above-mentioned base material, while covering the above-mentioned charge of foam on the front face of the above-mentioned base material, it can carry out by the sinking-in method explained in the 2nd manufacture approach, the suction method, or the air pushing-in method, for example. As the above-mentioned charge of foam, an urethane raw material is used, for example.

[0040] next, as an exhaust gas clarifying filter of this invention To the 1st, first For example, the base material according to claim 14 which has much pores like, In the exhaust gas clarifying filter which comes to have the coating layer which makes the catalyst which purifies the exhaust gas which is formed in the front face of this base material, and is discharged by the internal combustion engine support the above-mentioned coating layer While having the free passage hole which is open for free passage from the front face to the front face of a base material, the porosity of the above-mentioned coating layer has the exhaust gas clarifying filter characterized by being 30 - 80%.

[0041] In the above-mentioned exhaust gas clarifying filter, the free passage hole which the front face to a base material opens for free passage is prepared in the interior of the above-mentioned coating layer. Therefore, as mentioned above, the pressure loss of an exhaust gas clarifying filter is low, and the purification engine performance becomes high, and the miniaturization of a filter can be attained.

[0042] Moreover, in the above-mentioned exhaust gas clarifying filter, the purification engine performance of a filter can be made high, maintaining the pressure loss of a filter low, since the porosity of a coating layer is 30 - 80%. On the other hand, the pressure loss of a filter becomes high at less than 30% of case. In exceeding 80%, the purification engine performance of a filter falls.

[0043] Next, the thing [that it is 10-60 micrometers] according to claim 16 of the average pole diameter of the above-mentioned free passage hole is [like] desirable. The reason is for making pressure loss of a filter low, as mentioned above, and making the purification engine performance high.

[0044] Next, the thing [coming to cover the front face of the above-mentioned base material and the pore internal surface inside a base material] according to claim 17 of the above-mentioned coating layer is [like] desirable. The reason is that the emission-gas-purification engine performance of a filter becomes

remarkably high as mentioned above.
[0045] next, as an exhaust gas clarifying filter of this invention It has the coating layer which makes the 2nd support the catalyst which purifies the base material according to claim 15 which has much pores like, and the exhaust gas which is formed in this base material front face and the pore internal surface inside this base material, and is discharged from an internal combustion engine. In the becoming exhaust gas clarifying filter, while the above-mentioned coating layer has the free passage hole which is open for free passage from the front face to the front face of a base material, or the pore internal surface inside a base material, the porosity of the above-mentioned coating layer has the exhaust gas clarifying filter characterized by being 30 - 80%.
[0046] The coating layer is formed not only in the front face of a base material but in the pore internal surface inside a base material in the above-mentioned exhaust gas clarifying filter. Therefore, the catalyst supported by the coating layer adheres not only to the front face of a base material but to the pore internal surface inside a base material. Therefore, exhaust gas is purified also not only in the front face of a base material but in the pore internal surface inside a base material. So, the purification engine performance of exhaust gas becomes remarkably high. The point of others in the 2nd exhaust gas clarifying filter is the same as that of the exhaust gas clarifying filter of the above 1st, and the same effectiveness as the 1st exhaust gas clarifying filter can be acquired also in the 2nd exhaust gas clarifying filter.
[0047]
[The example of an operation gestalt]
The exhaust gas clarifying filter concerning the example of an operation gestalt of example of operation gestalt 1 this invention is explained using drawing 1 - drawing 6 . The exhaust gas clarifying filter 59 of this example has the base material 5 which has much pores 50, and the coating layer 1 prepared in the top face 51 and inferior surface of tongue 52 of a base material 5, as shown in drawing 1 . The coating layer 1 is supporting the catalyst 2 which purifies the exhaust gas discharged by the internal combustion engine.
[0048] The coating layer 1 has the free passage hole 10 which is open for free passage from the front face to the front face of a base material 5. As the free passage hole 10 is shown in drawing 2 , it is distributed considering the pole diameter D of 20-40 micrometers as a core, and the average pole diameter is 30 micrometers. The porosity of the coating layer 1 is 60%. An activated alumina is used as a coating layer 1. The pole diameter D of the free passage hole 10 was measured with the method of mercury penetration.
[0049] In the honeycomb filter which is a base material, the 40g [per the appearance volume of 1l.] coating layer 1 is covered. The amount of covering of the coating layer 1 was computed according to the weight difference before and behind coating. The coating layer 1 becomes the front face and the wall surface of the free passage hole 10 from the activated alumina which supported the catalyst 2. The thickness of the coating layer 1 is 5-50 micrometers. Pt (platinum), Rh (rhodium), etc. are used as a catalyst 2.
[0050] As shown in drawing 1 , the base material 5 has the pore 50 of a large number which penetrate the interior in the shape of a three-dimensions mesh, and is the Wall flow type which demonstrates a cleaning effect by making pore 50 pass exhaust gas. The average pole diameter of the pore 50 of a base material 5 is 20-40 micrometers.
[0051] The base material 5 constitutes the honeycomb which has many fluid ways 551,552, as shown in drawing 3 and drawing 4 (refer to drawing 23). And as shown in drawing 4 , in that downstream 62, the closure of the fluid way 551 of the upstream 61 in this honeycomb object is carried out with the closure plug 55. Moreover, in the upstream 61, the closure of the fluid way 552 of the downstream 62 is carried out with the closure plug 55. The above-mentioned fluid way 551 and the fluid way 552 are mutually arranged alternately in the shape of a checker.
[0052] The above-mentioned coating layer 1 is formed in both the front face of the fluid way 551 of the upstream 61, and the front face of the fluid way 552 of the downstream 62. Exhaust gas 7 flows from the fluid way 551 of the upstream 61, passes the coating layer 1, a base material 5, and the coating layer 1, and is discharged on the fluid way 552 of the downstream 62.
[0053] Next, the manufacture approach of the above-mentioned exhaust gas clarifying filter 59 is explained. First, the honeycomb filter made from cordierite (phi140mmx die length of 130mm, mesh 150 cel / in2, 0.45mm of wall thickness) was prepared, and this was made into the base material 5. Moreover, 5 % of the weight of alumina sols was mixed with 95 % of the weight of activated aluminas as ceramic powder, the aqua fortis for pH adjustment was added to this, and pH was adjusted to 1-3. The mean particle diameter of an activated alumina is 5-10 micrometers.
[0054] Subsequently, as free passage hole formation material, weight outside generation-of-gas matter 1.5 % and weight outside carbon powder 25 % were added to the 100 % of the weight of the above-mentioned

ceramic powder, distilled water was further added to it, and the slurry was obtained. The particle size of carbon powder is 10-80 micrometers, and is larger than the thickness (5-50 micrometers) of the coating layer which should be formed. The gas-charging material which enclosed the commercial butane with thermoplastics and was made granular as the above-mentioned generation-of-gas matter was used. Next, stirring the above-mentioned slurry, in it, it was immersed and the above-mentioned base material 5 was pulled up. Next, the air blow removed the excessive slurry and it dried at 120 degrees C for 2 hours.
[0055] Subsequently, it heated at 700 degrees C for 2 hours, and the above-mentioned ceramic powder was made to sinter. This formed in the front face of a base material 5 the coating layer 1 which consists of the above-mentioned ceramic powder. Moreover, the above-mentioned carbon powder was burned down on the occasion of this heating. Moreover, as shown in drawing 5 , the thermoplastics of the generation-of-gas matter 30 was burned down, and the commercial butane 300 enclosed in it escaped to the way outside the coating layer 1. The free passage hole 10 which is open for free passage from the interior of the coating layer 1 to the front face in that case was formed.
[0056] Then, the above-mentioned base material 5 in which the coating layer 1 was formed was immersed in the catalyst tub, and the coating layer 1 was made to support a catalyst 2. This obtained the above-mentioned exhaust gas clarifying filter 59 shown in drawing 1 .
[0057] The coating layer was produced, without using both the generation-of-gas matter and carbon powder for a comparison (example 1 of a comparison). In this case, as shown in drawing 6 , the above free passage holes were not formed in the coating layer 95, but it was [that the fine hole 19 with an average pole diameter of about 0.5-10 micrometers is only formed and]. On the other hand, in the exhaust gas clarifying filter of this example, as were mentioned above, and shown in drawing 1 , the free passage hole 10 whose average pole diameter centering on the pole diameter of 20-40 micrometers is 30 micrometers was formed.
[0058] Next, the operation effectiveness of this example is explained. In the exhaust gas clarifying filter of this example, as shown in drawing 1 , the free passage hole 10 of a large number which the front face to the base material 5 opens for free passage is formed in the interior of the coating layer 1. Therefore, exhaust gas can pass through between the front face of the coating layer 1, and base materials 5 smoothly through the free passage hole 10. For this reason, the fall of the pressure loss of the above-mentioned filter can be aimed at.
[0059] Moreover, exhaust gas enters not only the front face of the coating layer 1 but its interior. Therefore, the catalyst for emission gas purification supported by the coating layer 1 can demonstrate a cleaning effect in three dimensions in the whole coating layer. Therefore, improvement in the purification engine performance of a filter 59 can be aimed at.
[0060] Moreover, as mentioned above, a filter 59 has the high purification engine performance, and since pressure loss is low, it can also attain a miniaturization. Moreover, since the coating layer 1 is made to have supported the catalyst 2, it can do [catching a diesel particulate efficiently, burning after that, and reproducing a filter or]. Or HC in exhaust gas and CO can also be purified.
[0061] Moreover, in this example, as shown in drawing 4 , both sides of a base material 5 are covered with the coating layer 1. Therefore, exhaust gas 7 will pass the coating layer 1 over 2 times, in case it passes from the upstream 61 of a filter 59 to the downstream 62. Therefore, exhaust gas 7 can be purified effectively. Moreover, like the above, since the purification engine performance is high and the pressure loss of the engine performance is also low, a filter 59 can also be miniaturized.
[0062] In addition, although the coating layer 1 of this example was formed on the base material 5 of the Wall flow type which has the pore 50 which penetrates the interior, also when it prepares on the Wall through flow type base material 5 with very little this pore 50, it can aim at improvement in the purification engine performance, and control of pressure loss.
[0063] (Example 1 of an experiment) In this example, as shown in drawing 7 - drawing 9 , it measured about the specific surface area of a coating layer in the pore property of the filter (this is called sample 1.) shown in the above-mentioned example 1 of an operation gestalt and the rate of purification, and the list.
[0064] First, it evaluated about the pore property of an exhaust gas clarifying filter. A pole diameter and pore volume estimated the pore property of a filter. The pole diameter and pore volume of a filter were measured with the method of mercury penetration. Measurement only with the filter (sample C1) of the above-mentioned example 1 of a comparison which prepared the coating layer which does not have the free passage hole for the comparison in the base material front face, the filter (sample C2) which there is no coating layer and consists only of a base material, and a coating material without a free passage hole same also about (a sample C3) was performed. The result was shown in drawing 7 .
[0065] From this drawing, the pore property of the filter of a sample 1 was approximated with the filter

(sample C2) which consists only of a base material. The pore property of a filter (sample C1) of on the other hand having made the base material covering a coating layer without a free passage hole approximates only the coating material with the pore property of (a sample C3), and the pole diameter and pore volume are [both] small. This shows that it becomes the pore property approximated to the base material by preparing positively the free passage hole which the front face to a base material opens for free passage in a coating layer, and pressure loss of a filter can be made low.

[0066] Next, the specific surface area of the coating layer was measured about the filter of the above-mentioned sample 1. For the comparison, same measurement was performed also with the above-mentioned sample C1. The result was shown in drawing 8 . As known in this drawing, the coating layer of a sample 1 increased 30% from the coating layer of a sample C1.

[0067] Next, it measured about the pressure loss of the filter of the above-mentioned sample 1. The Measuring condition has arranged the above-mentioned filter to the engine exhaust gas path, and the engine used 2.2l. and DI (direct injection mold engine), and made them 2000rpm and 100Nm certain conditions. moreover, a comparison sake -- the above-mentioned sample C1 -- same measurement was performed even if attached C2. The result was shown in drawing 9 .

[0068] As known in this drawing, the filters of a sample 1 were the filter (sample C2) which consists only of a base material, and pressure loss low to the same extent. The filter (sample C1) which, on the other hand, formed the coating layer without a free passage hole in the base material front face had the remarkable rise of the pressure loss accompanying time amount progress. This shows that the pressure loss of the filter which prepared the free passage hole in the coating layer serves as a filter which consists only of a base material, and a value low to the same extent.

[0069] It is thought that the above result is based on the following reasons. That is, although the coating layer itself was a precise object, pore volume increased by having prepared the free passage hole. Therefore, the filter of the above-mentioned sample 1 showed the pore property approximated to the base material. Consequently, it is thought that it became low pressure loss comparable as a base material.

[0070] Next, the purification engine performance of the filter of the above-mentioned sample 1 was measured. The Measuring condition was made into engine-speed 2000rpm and 100Nm certain conditions. The above-mentioned rate of purification is HC, CO, and NOx. It measured per component and HC was shown as a representative here. Moreover, measurement with the same said of the filter (sample C1) which prepared the coating layer which does not have a free passage hole for a comparison was performed.

[0071] Consequently, in the case of the above-mentioned sample 1, it was 98% of rate of purification, and, in the case of the sample C1, was 92% of rate of purification. This shows that the filter of a sample 1 can demonstrate the outstanding purification engine performance.

[0072] (Example 2 of an experiment) In this example, as shown in drawing 10 - drawing 12 , the average pole diameter and porosity of a coating layer measured about the effect which it has on the pressure loss and the purification engine performance of a filter. First, the average pole diameter and porosity of a coating layer measured about the effect which it has on the pressure loss of a filter.

[0073] The average pole diameter of a coating layer and the pressure loss of a filter were measured by the same approach as the above-mentioned example 2 of an operation gestalt. The result was shown in drawing 10 . The pressure loss of a filter can be reduced, so that the average pole diameter of a coating layer becomes large, as shown in this drawing. Moreover, when [an average pole diameter] the same, the pressure loss of a filter can be reduced, so that the porosity of a coating layer becomes large.

[0074] Next, the average pole diameter of a coating layer and the porosity of a filter measured about the effect which it has on the purification engine performance of a filter. These measuring methods are the same as that of the above. The result was shown in drawing 11 . The rate of purification of exhaust gas with a filter becomes high, so that the average pole diameter of a coating layer becomes small, as known in this drawing. Moreover, when an average pole diameter is set constant, the rate of purification becomes high, so that the porosity of a coating layer becomes small.

[0075] Next, the average [as 10 or less kPas] pole diameter of a coating layer in case the rate of purification becomes as high as 90% or more with the as low and pressure loss of a filter, and porosity were shown in drawing 12 from the above-mentioned measurement result. In this drawing, point A-D shows the critical value of the range of the average pole diameter of the coating layer used as the pressure loss and the purification engine performance which were excellent in the above, and a pore diameter. The average pole diameter of each point and porosity are Point A (10 micrometers, 80%), Point B (20 micrometers, 60%), Point C (60 micrometers, 30%), and Point D (50 micrometers, 70%).

[0076] Pressure loss is 10 or less kPas, and the range (void part) which surrounded point A-D in a straight

line shows the case where the rate of purification is 90% or more. In within the limits of this, a filter is low pressure loss and demonstrates the high rate of purification. On the other hand, a downward part (right down line part) shows the case where pressure loss exceeds 10kPa(s), rather than straight lines AB and BC. An upper part (a part for an upward-slant-to-the-right line part) shows the case where the rate of purification becomes less than 90%, rather than straight lines AD and DC.

[0077] The example of two examples of an operation gestalt is an example which forms a free passage hole using the cylinder-like free passage hole formation material 31, as shown in drawing 13 . Pori Ester (trade name) of the resin made from Japanese synthetic chemistry burned down in the case of heating of ceramic powder, for example, a product, is used for the above-mentioned free passage hole formation material 31. The free passage hole formation material 31 is 50 micrometers in the diameter of 10-30 micrometers, and die length. The thickness of the coating layer 1 is 5-50 micrometers. This free passage hole formation material 31 is mixed with ceramic powder, and after drying, it is heated. Thereby, the free passage hole formation material 31 is burned down, and forms the free passage hole 10 which the front face to the base material 5 opens for free passage in the coating layer 1.

[0078] In addition, although a prism and a multiple column are sufficient as the free passage hole formation material 31 like the above besides cylindrical, if it is the thickness of the coating layer 1, and the magnitude more than equivalent, it can form the free passage hole 10. The coating layer 1 consists of an activated alumina, and the catalyst 2 for emission gas purification is supported by the front face and the wall surface of the free passage hole 10. Others are the same as that of the example 1 of an operation gestalt. Also in this example, the same effectiveness as the example 1 of an operation gestalt can be acquired.

[0079] In the exhaust gas clarifying filter of the example of three examples of an operation gestalt, as shown in drawing 14 , the free passage hole 10 is formed using the granular free passage hole formation material 32. Resin and a wax are used as free passage hole formation material 32. The major axis of the free passage hole formation material 32 is 40-100 micrometers, and is 10-60 micrometers of the minor axis. The coating layer 1 consists of an activated alumina, and the catalyst 2 for emission gas purification is supported by the front face and the wall surface of the free passage hole 10. The thickness of the coating layer 1 is 5-50 micrometers. Others are the same as that of the example 2 of an operation gestalt. Also in this example, the same effectiveness as the example 4 of an operation gestalt can be acquired.

[0080] In the exhaust gas clarifying filter of the example of four examples of an operation gestalt, as shown in drawing 15 , the free passage hole 10 is formed, using a whisker as free passage hole formation material 33. A whisker is a carbon whisker with a diameter of 40 micrometers. The coating layer 1 consists of an activated alumina, and the catalyst 2 for emission gas purification is supported by the front face and the wall surface of the free passage hole 10. The thickness of the coating layer 1 is 5-50 micrometers. Others are the same as that of the example 4 of an operation gestalt. Also in this example, the same effectiveness as the example 4 of an operation gestalt can be acquired.

[0081] In the filter of the example of five examples of an operation gestalt, as shown in drawing 16 , the free passage hole 101 which has the pole diameter of various magnitude in the coating layer 1 is formed. The aperture of the free passage hole 101 is widely distributed from 10 to 80 micrometers, and the average pole diameter is 40 micrometers. The coating layer 1 consists of an activated alumina, and the catalyst 2 for emission gas purification is supported by the front face and the wall surface of the above-mentioned free passage hole 10. The thickness of the coating layer 1 is 5-50 micrometers.

[0082] The above-mentioned free passage hole 101 was formed using the free passage hole formation material (generation-of-gas matter and carbon powder) which crosses to the range of 10 to 80 micrometers, and has various magnitude. It was added by ceramic powder, and the free passage hole formation material of the magnitude of these versatility added distilled water, and was taken as the slurry. The base material was immersed into this slurry, the excessive slurry was removed and it dried, and after that, it heated and the above-mentioned exhaust gas clarifying filter was obtained. Others are the same as that of the example 1 of an operation gestalt. Also in this example, the same effectiveness as the example 1 of an operation gestalt can be acquired.

[0083] In the filter of the example of six examples of an operation gestalt, as shown in drawing 17 , the free passage hole 102 of a comparatively big pole diameter is formed in the coating layer 1. The pole diameter of this free passage hole 102 is distributed from 40 to 100 micrometers, and that average pole diameter is 60 micrometers. Others are the same as that of the example 5 of an operation gestalt. In this example, since the aperture of a free passage hole is comparatively large, reduction-ization of the further pressure loss can be attained. Others can acquire the same effectiveness as the example 5 of an operation gestalt.

[0084] In the filter of the example of seven examples of an operation gestalt, as shown in drawing 18 , the

coating layer 1 is formed in base material 5 near front face of the fluid way 551 of the upstream 61, and the coating layer is not formed in the fluid way 552 side of the downstream 62. In manufacturing the above-mentioned filter, only one side of a base material was immersed in the slurry containing ceramic powder. Others are the same as that of the example 1 of an operation gestalt.

[0085] In this example, since the coating layer 1 is formed only in the fluid way 551 side of the upstream, after non-purified exhaust gas is purified by the coating layer 1, it passes a base material 5 and flows into the downstream 62. Therefore, uptake of the diesel particulate contained in exhaust gas is carried out effectively, and pressure loss has the description that it can do lower than that with which base material both sides were coated.

[0086] As the filter of the example of eight examples of an operation gestalt is shown in drawing 19 , the points which have covered the coating layer 1 not only on the vertical side of a base material 5 but on the front face of the pore 50 of the base material 5 interior differ in the example 1 of an operation gestalt.

[0087] The coating layer 1 which covers the vertical side of a base material 5 and the front face of pore 50 has the free passage hole 10 which is open for free passage from the front face to the front face of a base material 5, or the pore internal surface inside a base material. The average pole diameter of the free passage hole 10 is 20 micrometers. The porosity of the coating layer 1 is 62%, and the thickness is 2-20 micrometers. An activated alumina is used as a coating layer 1. The catalysts 2 for emission gas purification, such as Pt and Rh, are supported by the front face of a coating layer, and the wall of the free passage hole 10. The base material 5 has the pore 50 of a large number which penetrate the interior in the shape of a three-dimensions mesh. The average pole diameter of pore 50 is 20-40 micrometers.

[0088] Next, in manufacturing the above-mentioned exhaust gas clarifying filter, fundamentally, it is the same as the above-mentioned example 1 of an operation gestalt. However, in the point that the mean particle diameter of free passage hole formation material is 10-30 micrometers, and the honeycomb filter which is a base material, the points which covered the 65g [per the appearance volume of 1l.] coating layer differ.

[0089] The coating layer 1 is formed not only in the vertical side of a base material 5 but in the front face of the pore 50 of the base material 5 interior in this example. Therefore, the catalyst 2 supported by the coating layer adheres not only to the vertical side of a base material 5 but to the front face of the pore 50 of the interior. So, the exhaust gas touch area of a catalyst 2 increases, and the purification engine performance of exhaust gas increases remarkably. Moreover, the front face of pore 50 is covered from the coating layer 10 which has the free passage hole 10. Therefore, pore 50 cannot start blinding but can pass exhaust gas smoothly.

[0090] In addition, when a filter was manufactured without using free passage hole formation material, as shown in drawing 20 , the pore 50 of a base material 5 was blockaded by the coating layer 1 (ceramic powder).

[0091] (Example 3 of an experiment) In this example, the relation between the amount of covering of ceramic powder and the pressure loss of a filter was measured. It was in charge of measurement, and it is the class same as ceramic powder as the ceramic powder in the example 8 of an operation gestalt, and the ceramic powder of the same magnitude was used. The amount of covering of ceramic powder was changed among per [0-75g] appearance volume of 1l. of the honeycomb filter which is a base material. Others manufactured the filter like the example 8 of an operation gestalt, and made this the sample 2. Moreover, for the comparison, the filter was manufactured without using free passage hole formation material, and this was made into the sample C4.

[0092] Next, the downstream was made to pass works air (5kg/cm2) by 2000l./from the upstream of a filter. The pressure loss of the filter at this time was measured. The result was shown in drawing 21 .

[0093] As known in this drawing, even if the amount of covering of ceramic powder increased the filter of a sample 2, pressure loss hardly changed. On the other hand, pressure loss also became large rapidly as the amount of covering of ceramic powder increased the filter of a sample C4. From this, by forming the free passage hole which is open for free passage from the front face of a coating layer to the front face of a base material or the pore internal surface inside a base material shows maintaining the pressure loss of a filter, while it has been low like this invention. Moreover, when the amounts of covering of ceramic powder are per [10-50g] appearance volume of 1l. of a honeycomb filter, it turns out that the filter of low pressure loss can be manufactured.

[0094] (Example 4 of an experiment) In this example, the relation between the amount of uptake of a diesel particulate in the exhaust gas by the exhaust gas clarifying filter and the pressure loss of a filter was measured. The filter with which measurement is presented is a filter manufactured in the example 8 of an operation gestalt, and made this the sample 3.

[0095] Moreover, this measurement was performed by making into a sample C6 the filter which made the direct catalyst adhere to a base material, without having made into the sample C5 the filter in which the coating layer was formed, without using free passage hole formation material, and using ceramic powder and free passage hole formation material for a comparison. In addition, the thickness of the coating layer of a sample 3 and a sample C5 is 2-20 micrometers, and the amount of covering of a coating layer is 65g per appearance volume of 1l. of a honeycomb filter.
[0096] The above-mentioned filter has been arranged to the engine exhaust gas path in measurement. The diesel power plant with a displacement of 4.2l. was used for the engine, and it operated it in the state of 1600rpm and accelerator full open (W. O.T). The amount of uptake of a diesel particulate and the pressure loss of a filter with the filter at this time were measured, and that result was shown in drawing 22 .
[0097] The pressure loss of a filter also became large as known in this drawing, and the amount of uptake of a diesel particulate increased both [a sample 3 and] C5 and C6. And the pressure loss of the filter (sample 3) which added free passage hole formation material and formed the coating layer was not filled with free passage hole formation material additive-free 1.5 times to the pressure loss of the filter (sample C6) in which the coating layer was formed. On the other hand, with the filter (sample C5) which formed the coating layer by free passage hole formation material additive-free, it was 2 to 3 times as many pressure loss as this to the sample C6. Compared with a free passage hole formation material additive-free case, the exhaust gas clarifying filter of low pressure loss can be obtained from this by adding free passage hole formation material to ceramic powder, and forming a free passage hole in a coating layer.
[0098]
[Function and Effect] According to this invention, the exhaust gas clarifying filter which can attain reduction-ization of pressure loss with improvement in the purification engine performance, and its manufacture approach can be offered.

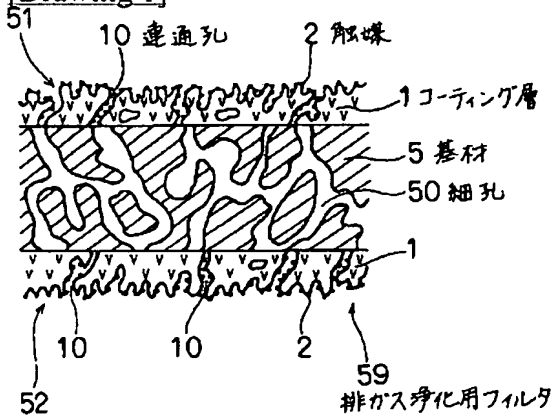
[Translation done.]

* NOTICES *

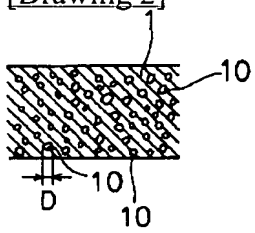
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

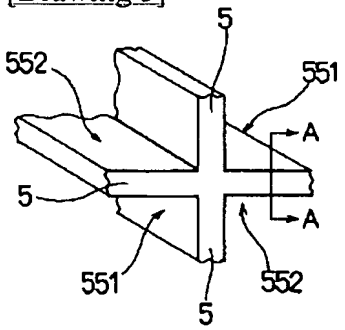
[Drawing 1]



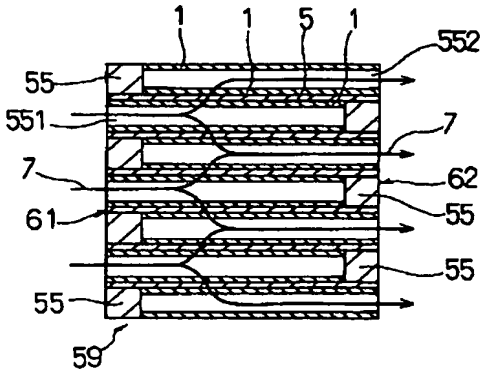
[Drawing 2]



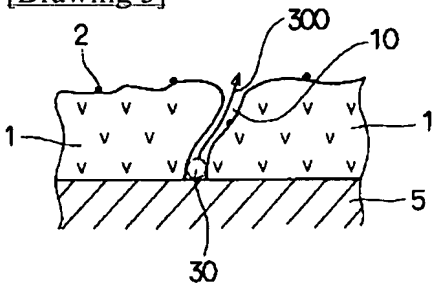
[Drawing 3]



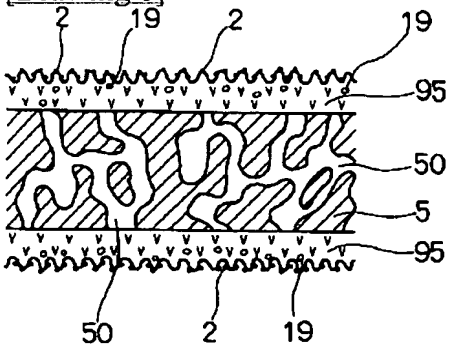
[Drawing 4]



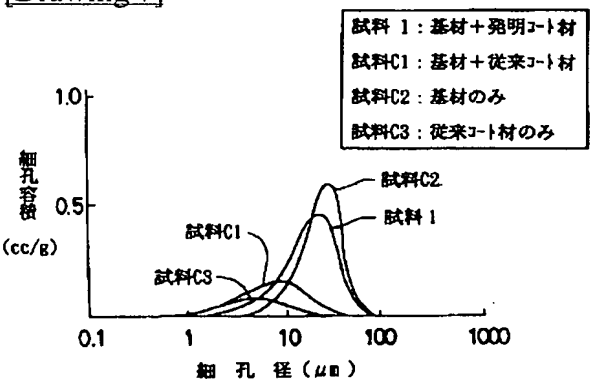
[Drawing 5]



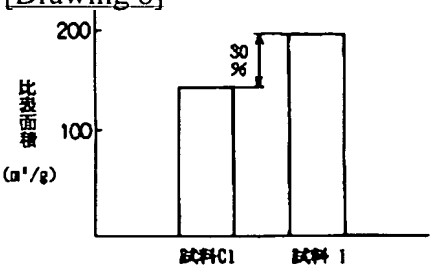
[Drawing 6]



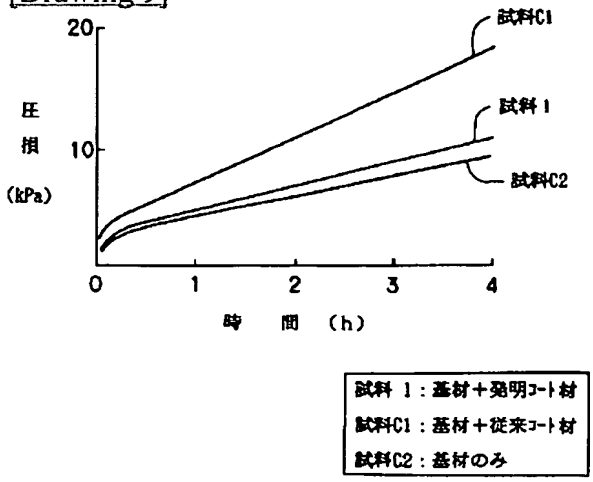
[Drawing 7]



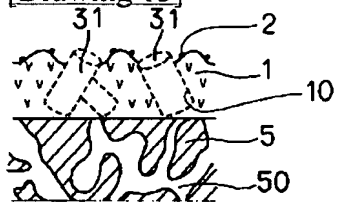
[Drawing 8]



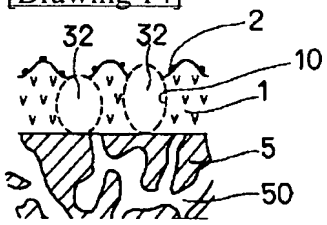
[Drawing 9]



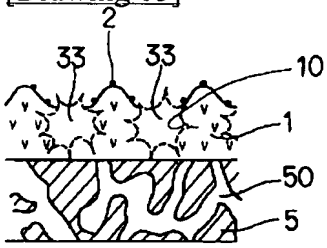
[Drawing 13]



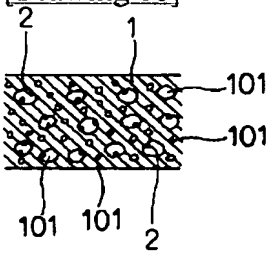
[Drawing 14]



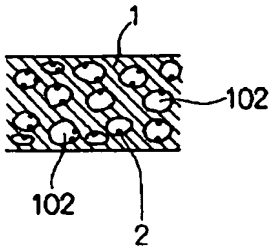
[Drawing 15]



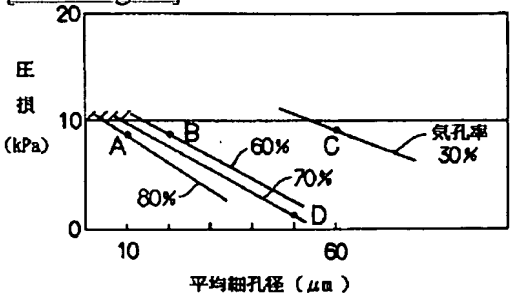
[Drawing 16]



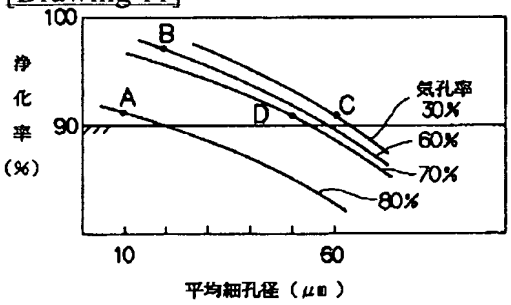
[Drawing 17]



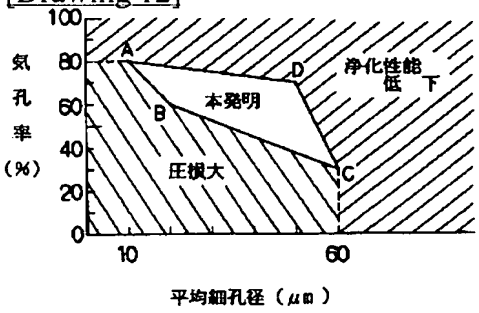
[Drawing 10]



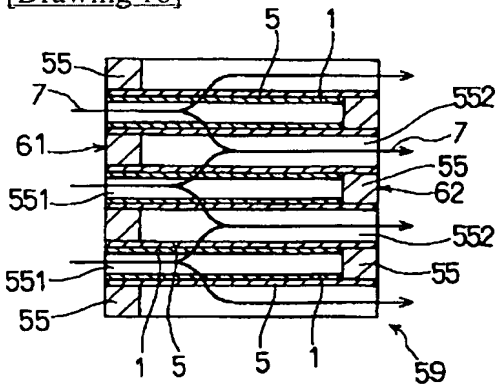
[Drawing 11]



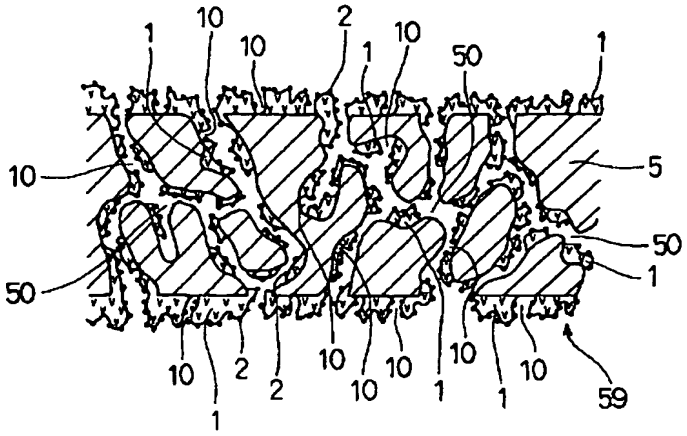
[Drawing 12]



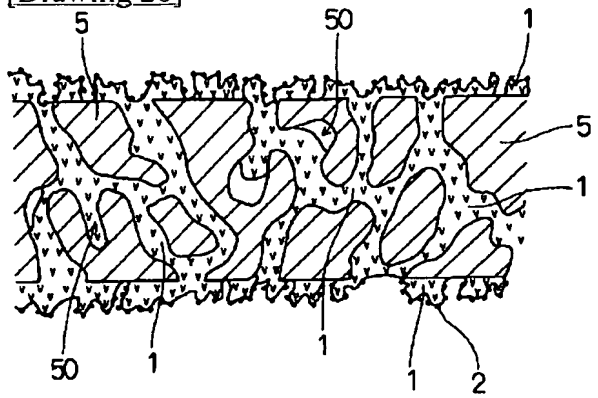
[Drawing 18]



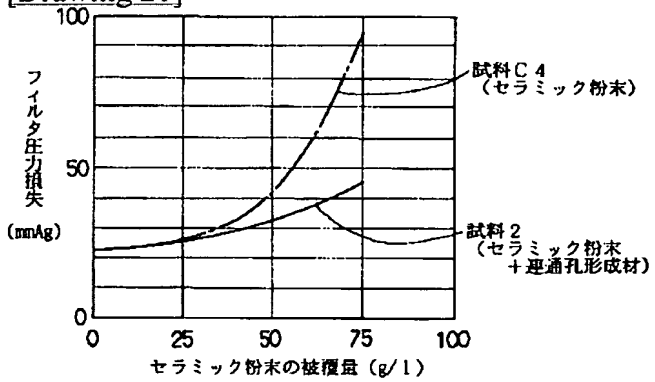
[Drawing 19]



[Drawing 20]



[Drawing 21]



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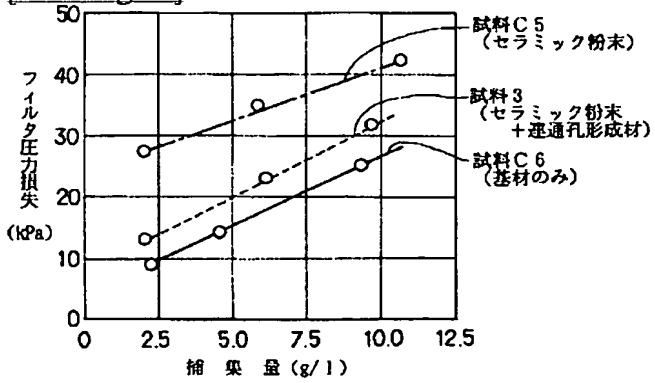
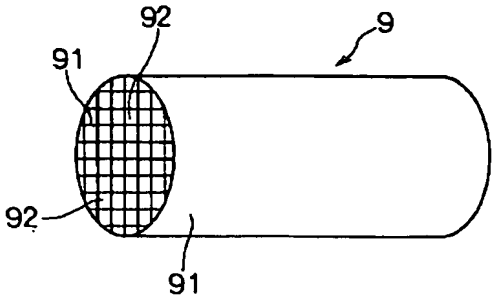


[Drawing 23]



[Translation done.]